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MSU Extension Crops Newsletter for Northwest Michigan

Northwest Michigan Crop Producer, **October 2013**

Harvest season for fall grain crops has finally arrived and it is bringing along with it an assortment of challenges. This newsletter is full of information that may help you to make wiser harvest decisions. Hoping your farm has a safe and bountiful harvest season!

Jerry Lindquist

MSU Extension Grazing & Crop Management Educator

Expanding Use of Cover Crops

There is growing interest in the use of cover crops (pun intended). Cover crops like buckwheat and field grain rye were used during the dust bowl era of the 1930's to reduce soil erosion and to provide a green manure crop that could be plowed down to restore soil quality. Today the list of possible cover crops is large, the realized benefits of their use continues to grow, and the creative ways that their use can be maximized seems to be un-limited.

Cover crops are still great at reducing soil erosion caused by wind and water. Many are also good at reducing weed competition but new innovations and research have found many more uses and benefits.

The green manure concept as a soil improver has gotten a lot more attention recently because of the rising cost of fertilizer, the desire for the use of less chemical inputs from the organic movement, and severe dry weather events putting more moisture stress on crops. Crops like buckwheat are known to root deep below the tillage zone of the soil mining up soil nutrients to the surface to be recycled, improving soil fertility in the end. Many of the crops with tubers like radishes and turnips, grab on to nitrates in fall from manure application, and hold them till they die and decompose then recycling them for the next crop season in the spring and early summer. All of these crops produce abundant plant material that dies and decomposes as organic matter both on the soil surface from the stems and leaves and in the subsoil in the form of roots and tubers. This organic matter as it decomposes holds more nutrients and moisture in the soil. This decaying plant material and organic matter also feeds soil organisms like earthworms, bacteria, fungi, protozoa, nematodes and arthropods that help to enrich the soil food chain/web leading to healthier, more productive soils.

Inside this issue:

And that is just the start of what cover crops do. Beyond the soil moisture holding capacity of organic matter from cover crops, the growing crop also shades the soil, reducing soil evaporation from the wind and sun. This cooling effect from the crop stimulates more microorganism activity in the upper soil surface. Also the decaying roots of the cover crop, some of them growing down two or more feet deep in the soil, once decomposed provide channels for rainfall to entry and to be held in the field rather than running off the surface leading to soil erosion, nutrient loss, and more flooding in the downstream watershed. This extra water holding capacity of fields with cover crop use is preserved even more with the utilization of no till so that worm and root channels are not destroyed with tillage each year.

Certain cover crops like radishes, annual ryegrass, and clovers are also found to break soil compaction zones caused by tillage and wheel traffic. The clovers and other legumes also fix nitrogen from the air and release it in the soil for use by other plants the next growing season. All plant roots on their microscopic root tips have a zone of activity referred to as the rhizosphere that produces among other things a compound called glomalin. Glomalin is the organic glue of soil particles holding soil particles together and holding carbon in the soil enhancing soil productivity. The more roots in the ground for more days of the calendar year leads to more production of glomalin and all the other benefits listed above.

Good cover crop managers strive to have a living root that has beneficial attributes (not a plant that could be a weed in later crops) growing in their fields for as many days of the year as possible. Thus after wheat, corn or soybean harvest they try to seed a cool season cover crop in if there is any time left in the growing season – normally mid-October is the cut-off in much of Michigan. They hate to see fields set idle for half the year when they could be producing so much more.

The latest innovation in cover crops is the use of mixed cover crops. By blending more than one crop species together farms believe they are realizing enhanced or multiple benefits. For example mixing radishes, vetch and annual ryegrass would provide a nitrogen generator, a nitrogen scavenger/recycler, and a soil compaction buster. Also there is the concept that each different plant sends roots down to different soil depths mining and impacting different zones, and that each plant species influences different soil organisms and thus improves different attributes of the soil. With these cocktail cover crop mixes they are blending five, ten or sometimes more than twenty different plant species together in one planting mix. “The more plant species in the mix the better is their attitude.”

Sheep grazing oats and turnips cover crop.

Finally one other great benefit of cover crops is the feed that they can provide for a grazing animal. Rather than using mechanical horsepower to till the cover crop into the soil, cattle, sheep, goats or other grazing animals can turn the cover crop into a true green manure. This process is mutually beneficial as the plant nutrients are made available more rapidly for the soil organisms and the animals are provided a highly nutrious, low cost feed source in the late fall – early winter season when usually high cost hays must be fed. This such a mutual benefit for soil as well as animal that cash crop with no animals are seeding grazing fall cover crops and asking livestock farms to graze those crops in late fall. The grazing farm provides the portable electric fence, the water supply and the management, and many times are given the grazing land for free because of the benefit it gives to the soil above and below the soil surface.

A cover crop tour is upcoming in the Osceola County area to highlight their use and benefits. See the enclosed flier.

MICHIGAN STATE UNIVERSITY Extension

GLCCI The Great Lakes Cover Crop Initiative

Mid–Michigan Cover Crop Farm Tour

October 30th, 2013, 9 am to 4 p.m.

Meeting Place:

Reed City Boy Scout Building

225 E. 5th Ave.

(Sign Reads Coats Ave.)

Reed City, MI

Tour includes lunch and transportation to each site

And will run regardless of RAIN-SLEET-SNOW-OR-SHINE

RSVP to:

MSU Extension
Lake County Office
PO Box 274
Baldwin, MI 49304
Phone: 231-745-2732
Email: tapplewh@anr.msu.edu

If you require special accommodations please call the Lake County MSU Extension office no later than October 20th, 2013

This tour will include five stops at farms near Reed City, Chase, LeRoy and Marion looking at over twenty-one different cover crop trials.

MICHIGAN STATE UNIVERSITY | Extension

GLCCI
The Great Lakes Cover Crop Initiative

Mid-Michigan Cover Crop Field Tour

October 30, 2013

9:00-9:15	Meet and Depart from the Boy Scout Building in Reed City Introduction to MAEAP
9:45-10:40	Dan Blackledge Field Marion- Dr. Dean Baas, MSU Extension Cover Crops Terry Stiles, Cisco Seeds Introduction to Cover Crops Cover Crop Selection Cover Crops to Reduce Soil Compaction
11:15-12:15	Gingrich Meadows Fields LeRoy- John Durling, NRCS Rose Lake Plant Materials Center How to put cover crops into a rotation Cover Crops and Manure Application

Box Lunch Provided on Bus by Mid-Michigan Idlewilder's

1:00-2:30	Jason Gawne Field Chase - John Leif, NRCS Rose Lake Plant Materials Center Cover Crop Seeding Rates Jack Thornton Field Chase Using Cover Crops for Soil Health
3:00-4:00	Chris Harrington Field Paris- Jerry Lindquist, MSU Extension Forage Educator, Dr. Kevin Todd, DVM, Gerry Davis, Byron Seeds Using Cover Crops as feed Using Cover Crops to extend grazing
4:30	Return to Boy Scout Building in Reed City

Pesticide Recertification Credits have been requested for this event

NRCS Natural Resources Conservation Service — OSCEOLA-LAKE CONSERVATION DISTRICT — MAEAP

Field Drydown of Mature Corn Grain

R.L. (Bob) Nielsen, Agronomy Dept., Purdue Univ.
West Lafayette, IN 47907-2054
Email address: rnielsen at purdue.edu

- Weather conditions strongly influence in-field grain drydown.
- Plant characteristics can also influence in-field grain drydown.
- Early grain maturation usually means faster in-field grain drydown.
- Later grain maturation usually means slower in-field grain drydown.

Delayed maturity of corn due to late planting or simply cool growing seasons often translates into delayed or slow drydown of mature corn grain prior to harvest and, consequently, higher than desired grain moisture contents at harvest. Wetter grain at harvest increases the need for artificially drying the grain after harvest which, in turn, increases the growers' production costs and can delay the progress of harvest itself. Conversely, an early or rapid drydown of the crop decreases growers' costs and facilitates early or at least timely harvest of the crop prior to the colder and, often, wetter conditions of late fall.

Kernel moisture content decreases as the kernels develop through the blister stage (~ 85% moisture), milk stage (~ 80% moisture), dough stage (~ 70% moisture), dent stage (~ 55% moisture), and finally physiological maturity (~ 30% moisture). Prior to physiological maturity, decreases in kernel moisture occur from a combination of actual water loss (evaporation) from the kernel plus the continued accumulation of kernel dry matter via the grain filling process. After physiological maturity (identified by presence of the kernel black layer), percent kernel moisture continues to decrease primarily due to water loss from the kernel.

Weather & Timing of Grain Maturation

Grain moisture loss in the field occurs at a fairly linear rate within a range of grain moisture content from about 40 percent down to 15 to 20 percent, and then tapers off to little or no additional moisture loss after that. The exact rate of field drying varies among hybrids and years. Figure 1 illustrates changes in grain moisture content over time for an adapted medium maturity hybrid in two years with different temperature patterns following physiological maturity.

Field drying of mature corn grain is influenced primarily by weather factors, especially temperature and humidity/rainfall. Simply put, warmer temperatures and lower humidity encourage rapid field drying of corn grain. Figure 2 illustrates the relationship between the average daily temperature over the entire drydown period and the average daily rate of field drying over the entire drydown period.

Because grain drydown rates are greater when the drydown period is warmer, it stands to reason that a corn crop that matures in late August will dry down faster than one that matures in mid-September. In fact, there is a close relationship between the date when the grain nears physiological maturity (half-milkline or 2 to 3 weeks prior to kernel blacklayer) and the subsequent average daily drydown rate. Average daily drydown rates will range from about 0.8 percentage point per day for grain that nears maturity in late August to about 0.4 percentage point per day for grain that nears maturity in mid- to late September (Fig 3).

Bear in mind that grain moisture loss for any particular day may be quite high or low depending on the exact temperature, humidity, sunshine, or rain conditions that day. It is not unheard of for grain moisture to decline more than one percentage point per day for a period of days when conditions are warm, sunny, windy and dry. In contrast, there may be zero drydown of grain on cool, cloudy, rainy days.

Continued on Page 5...

Field Drydown of Mature Corn Grain cont...

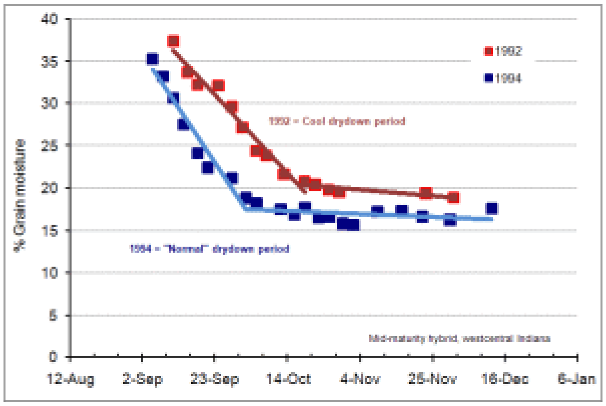

Fig. 1. Example of field drying progress of a mid-maturity corn hybrid in 2 years with different temperature patterns.

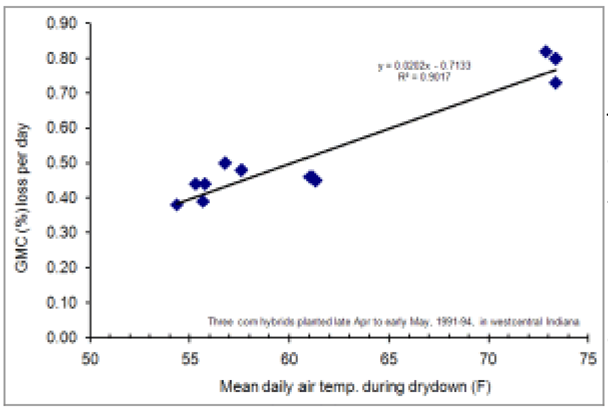

Fig. 2 Average daily grain moisture loss (percentage points/ day) relative to average daily air temperature during the drydown period for three corn hybrids planted late April to early May. 199-1994, west central Indiana.

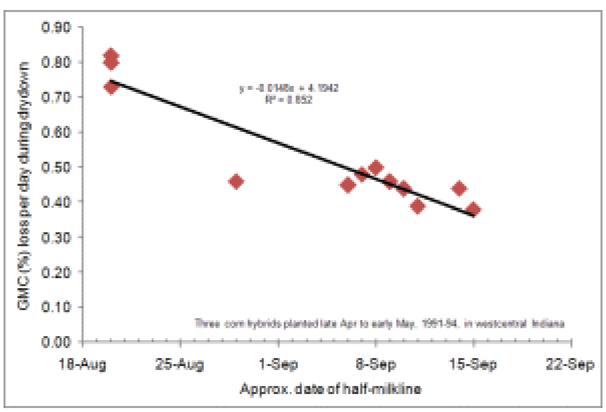

Fig. 3 Relationship between field drying rate and the date at which the grain nears maturity (half-milkline) for three corn hybrids planted late April to early May, 1991-1994, west cental Indiana.

Weather-Related Crop Stress and Field Drydown of Grain

Farmers often question whether field drydown will occur "normally" after some severe weather-related stress damages the crop prior to physiological maturity or causes premature death of the plants. Examples of such weather stress include damage caused by severe drought plus heat, late-season hail storms, and frost or killing freeze events prior to physiological maturity.

The answer in all cases to whether grain drydown will occur "normally" is essentially "yes", but this requires a bit of explanation.

Lingering severe stress such as drought or foliar disease (e.g., gray leaf spot) that occurs during the latter stages of the grain filling period typically causes premature death of the plants, smaller than normal kernels, AND premature formation of kernel black layer. The latter two factors usually result in earlier than expected drydown of the grain to the extent that grain moisture content in severely affected areas of a field is usually drier at harvest than lesser affected areas. The fact that grain drydown of the "prematurely mature" grain begins earlier usually means it occurs in relatively warmer time periods and so grain drydown rates per day are higher than would be expected if the grain had matured "normally" at a later date. However, the rate of grain drydown is "normal" for the time period during which the grain is drying.

NOTE: When areas of fields die prematurely due to stresses like drought, spatial variability for grain moisture at harvest can be dramatic and often creates challenges with the management of the grain dryer operation. This is especially true early in the harvest season when grain moistures of healthier areas of the field are in the low 20's. The spatial variability for grain moisture decreases later in the harvest season as grain moistures throughout the field settle to an equilibrium level (15% or less).

The effects of a sudden single stress event like hail or lethal cold temperatures prior to physiological maturity often create an optical illusion of sorts relative to subsequent field drying of the grain. Because leaf or plant death of an immature crop may occur quite rapidly in response to severe hail damage or lethal frost / freeze events, the moisture content of the yet immature grain will "appear" to be quite high given that the appearance of the now dead plants would seem to suggest the crop was "mature". In fact, subsequent field drydown of the affected grain will occur fairly normally relative to their immature stage of development (Hicks, 2004). The appearance of the dead plant tissue gives the illusion that field drydown was slowed by the damage from the hail or frost/freeze.

Continued on Page 6...

Field Drydown of Mature Corn Grain cont...

Corny Trivia: Grain in fields severely damaged or killed by severe stresses during the grain filling period will always reach physiological maturity (kernel black layer). The significant reduction or complete cessation of photosynthate availability due to damaged or dead plants will eventually lead to the death and collapse of the placental tissue at the tips of kernels that then develops into the so-called "black layer."

Hybrid Variability for Field Drydown

Hybrid variability for the rate of grain moisture loss during post-maturity drydown and the eventual grain moisture content at harvest are of great interest to grower and seed industry alike. Growers desire hybrids with superior yielding ability (maximum gross income) that also dry very quickly in the fall (minimum drying or grain shrinkage costs).

The seed industry uses grain moisture content data to assign relative hybrid maturity ratings on the basis of relative moisture differences among hybrids at harvest (Nielsen, 2012). Two hybrids that differ by one "day" of relative maturity will typically vary by about one half percentage point of grain moisture content (an average daily loss of moisture) if planted and harvested on the same days. Recognize that relative hybrid maturity ratings are most consistent within, not among, seed companies.

When weather conditions are great for rapid grain drydown, hybrids tend to dry at fairly similar rates. When weather conditions are not favorable for rapid drydown, then hybrid characteristics that influence the rate of grain drying become more important.

Researchers have identified the following traits or characteristics as ones most likely to influence grain drying in the field. The relative importance of each trait varies throughout the duration of the field drydown process and, as mentioned earlier, is most influential when weather conditions are not conducive for rapid grain drying.

- **Kernel Pericarp Characteristics.** The pericarp is the outermost layer of a corn kernel (botanically; the ovary wall). Thinner or simply more permeable pericarp layers have been associated with faster drying rates in the field.
- **Husk Leaf Number.** The fewer the number of husk leaves, the more rapid the grain moisture loss. In fact, modern hybrids have fewer husk leaves than those commonly grown years ago.
- **Husk Leaf Thickness.** The thinner the husk leaves, the more rapid the grain moisture loss.
- **Husk Leaf Senescence.** The sooner the husk leaves senesce (die), the more rapid the grain moisture loss.
- **Husk Coverage of the Ear.** The less the husk covers the tip of the ear, the more rapid the grain moisture loss.
- **Husk Tightness.** The looser the husk covers the ear, the more rapid the grain moisture loss.
- **Ear Declination.** The sooner the ears drop from an upright position after grain maturation to a downward position, the more rapid the grain moisture loss. In particular, husks of upright ears can "capture" rainfall.

Final Trivia For Coffeeshop Conversations

Interestingly, there is little, if any, documented evidence that moisture loss occurs through the pedicel (kernel connection to the cob) of the kernel through the cob tissue. Post-maturity grain moisture loss occurs primarily by evaporative loss from the kernel itself. Research many years ago established that post-maturity moisture loss through the kernel connective tissues (placental tissues) back to the cob is essentially non-existent (Kiesselbach and Walker, 1952; Crane et al., 1959). As those tissues cease to function (associated with the onset of kernel black layer and physiological maturity), the moisture and nutritional connection between kernel and cob is essentially broken.

Harvest Delays Impact Corn Performance

Peter Thomison, Allen Geyer, Rich Minyo, The Ohio State University Extension

Leaving corn to dry in the field exposes a crop to unfavorable weather conditions, as well as wildlife damage. A crop with weak plant integrity is more vulnerable to yield losses from stalk lodging and ear drop when weathering conditions occur. The widespread root lodging that occurred as a result of wind storms in July is contributing to this problem. Additional losses may occur when ear rots reduce grain quality and can lead to significant dockage when the grain is marketed. Some ear rots produce mycotoxins, which may cause major health problems if fed to livestock.

Several years ago we conducted a study that evaluated effects of four plant populations (24,000, 30,000, 36,000, and 42,000 plants/A) and three harvest dates (early-mid Oct., Nov. and Dec.) on the agronomic performance of four hybrids differing in maturity and stalk quality. The study was conducted at three locations in NW, NE, and SW Ohio over a three year period for a total of eight experiments. Results of this study provide some insight on yield losses and changes in grain moisture and stalk quality associated with delaying harvest. The following lists some of the major findings from this research.

KEY FINDINGS

- Results showed that nearly 90% of the yield loss associated with delayed corn harvest occurred when delays extended beyond mid-November.
- Grain moisture decreased nearly 6% between harvest dates in Oct. and Nov. Delaying harvest after early to mid Nov. achieved almost no additional grain drying.
- Higher plant populations resulted in increased grain yields when harvest occurred in early to mid-October. Only when harvest was delayed until mid-November or later did yields decline at plant populations above 30,000/acre.
- Hybrids with lower stalk strength ratings exhibited greater stalk rot, lodging and yield loss when harvest was delayed. Early harvest of these hybrids eliminated this effect.
- The greatest increase in stalk rot incidence came between harvest dates in October and November. In contrast, stalk lodging increased most after early-mid November.
- Harvest delays had little or no effect on grain quality characteristics such as oil, protein, starch, and kernel breakage.

In this study, yields averaged across experiments, populations and hybrids, decreased about 13% between the Oct. and Dec. harvest dates. Most of the yield loss, about 11%, occurred after the early-mid Nov. harvest date. In three of the eight experiments, yield losses between Oct. and Dec. harvest dates ranged from 21 to 24%. In the other five experiments, yield losses ranged from 5 to 12%.

Grain moisture content showed a decrease from the Oct. to Nov. harvest dates but little or no change beyond the Nov. harvest dates. Grain moisture, averaged across experiments, hybrid, and plant population, decreased 6.3% points between the Oct. and Dec. harvest dates, with most of the decrease occurring between the Oct. and Nov. harvest dates (5.8 % points); only a 0.5 % point decrease occurred after early-mid Nov. Population effects on grain moisture content were not consistent. Differences in grain moisture were evident among hybrids on the first harvest date in early-mid Oct. but were generally negligible on the later dates.

A Field Loss Calculator for Field Drying Corn

Agronomists at the University of Wisconsin have developed a “Field Loss Calculator” Excel spreadsheet available at: http://corn.agronomy.wisc.edu/Season/DSS.aspx that allows producers to calculate the costs of harvesting today versus allowing the crop to stand in the field and harvesting later. The spreadsheet accounts for higher drying costs versus grain losses during field drying. It allows the user to account for elevator discounts and grain shrink.

Learn Not to Burn During this Busy Harvest Season

John Shutske, University of Wisconsin-Madison Biological Systems Engineering

The late September USDA crop report for Wisconsin shows that we are a bit behind average on harvested acres for corn and soybeans and well behind last year's drought-induced early harvest. So, October promises to be a bit rushed for many growers, and conditions appear to be relatively more dusty this fall. Time will be critical, and it's also crucial that you avoid a costly and potentially devastating combine fire!

A 2002 study showed that crop residue is the material most often first involved in a grain combine fire. Our study of almost 9,000 fires also showed that more than 75% of fires start in the engine compartment, though they tend to often rapidly spread to other parts of the machine. Fires become especially severe when fuel lines rupture from the heat or hydraulic hoses are compromised. When tires become involved in a fire, the result is almost always a near total loss. Based on what we know, the most critical information is to keep your engine compartment clean of all crop residue and any buildup of greasy/oily material. Different machines have different "patterns" for crop residue buildup in the engine area. This can even change a bit from year to year as a result of conditions (wind, relative humidity, and dustiness). Take time to blow out or find other ways to remove any buildup of crop trash daily or as is needed. All fires need an ignition source. Often, exhaust components (turbochargers, manifolds, mufflers) are involved, but faulty bearings or malfunctioning electrical systems can also be the culprit.

All grain combines need to be equipped with at least two 10- pound ABC dry chemical fire extinguishers. Larger ones are even more preferable, though they are a little more clumsy to handle. Avoid new "high tech" fire suppression liquids (that I often see being sold in spray cans at farm and machinery shows) unless they are tested and explicitly approved for dry, cellulosic-type material (crop residue) AND liquid fuels by Underwriter's Laboratory. The "ABC" compound means the extinguisher will work on Class A crop residue, Class B flammable liquids, and is non-conductive so it can be used on electrical components.

If you do experience a fire, pull away from the standing crop and shut the machine down. Call for help. Use your extinguisher(s) with great care and fight the fire by aiming at the base of the flames. Again, the engine must be shut off or air movement will simply fan the fire and blow the extinguishing powder out. Also, if you experience even a small fire that you are able to put out, correct the problem that caused it before you resume and make sure to contact your insurance company. Harvest is the most dangerous time of the year. Be proactive and careful to protect your safety and your investment!

Renew Farmland Rental Agreements Now

Farmland rental agreements need to renew before 2014 crop preparation begins.

Dennis Stein, Michigan State University Extension

For most farms the preparation for the 2014 crop production season has already begun with the planting of the winter wheat crop. Most farms are fully engaged in fall tillage and fertilizer applications for the planned 2014 crop production season. For a landlord, this means that the current farmland renter is well underway with plans to produce crops on the rented land during the 2014 crop production season. Asking to make changes or adjustments to a farmland rental agreement after operations have already started makes things much more complicated. Complications can compound if there is no written agreement. Without written terms, both parties resort to their assumptions of the lease terms, which may not coincide.

Both landowners and lessees should review their lease document to determine the notification deadlines for proposed lease changes. If either party wishes to alter an existing agreement, the written notice deadline of any intent to change a current farm land rental agreement should be one of the terms of the lease. It is common for this type of notice to be given well before the final date for giving termination notice. For example, a landlord not giving notice to their current renter in advance of fall tillage, fertilization or planting will leave the landowner liable for full reimbursement for all costs that the current renter has invested in preparation for the 2014 crop production season. If the renter has forward contracted the winter wheat production, the landlord may carry the economic responsibility for the full value of the contracted wheat.

The terms and conditions of any farm and rental agreement should be in a written format that both the landlord and the renter can understand. Some example farm land rental agreements can be found and downloaded from the FIRM web page of Michigan State University Extension, including the Michigan Cash Cropland Lease, along with other farm land rental surveys and farm land values surveys. It is important for landlords and lessees to understand that the rental value of any one parcel of land is highly variable and tied to several production and economic factors. A farm land rental value checklist is also available for download.

This article was published by **Michigan State University Extension**. For more information, visit http://www.msue.msu.edu. To contact an expert in your area, visit http://expert.msue.msu.edu, or call 888-MSUE4MI (888-678-3464).

Growing Local Barley for Local Beer-Making

Statewide interest in local barley has Michigan State University moving ahead with research on malting barley.

Jim Isleib, Michigan State University Extension

Barley production ranks a distant third among small grains in Michigan, with approximately 8,000 acres harvested in 2011 compared to 30,000 acres of oats and 680,000 acres of wheat in 2011 according to the National Agricultural Statistics Service. With a price of $3.50 per bushel and average yield of 48 bushels per acre, it is no surprise that grain farmers were not diving into barley production. Most of the barley grain produced was used for livestock feed on-farm or sold at local elevators. Barley is a reasonable choice for on-farm feed production.

Barley is comparable to corn in feed value with about 9 percent less energy and higher available phosphorus. Grain is generally ground or rolled before feeding to improve feed efficiency. Some barley is stored as a high-moisture grain. Barley is still a good option in areas of the state where growing conditions make corn grain production unreliable. Your local Michigan State University Extension educators can provide information on barley varieties, production practices and feeding programs.

The real excitement in the Michigan barley picture has nothing to do with livestock or feed grains. The current, rapid growth in the Michigan craft brewing industry has resulted in strong interest in locally sourced ingredients for locally produced beer. For several years, MSU Extension has been involved in development of hops production in the Grand Traverse Bay area. Interest has also emerged regarding local availability of malt for small breweries. For malt products to be truly local, high-quality, malting grade barley grain must also be available locally. Malting barley grain standards are very high, requiring a higher level of crop management than feed-grade barley. The anticipated price for locally produced malting barley when a new, niche market emerges should make the effort to grow it worthwhile.

Over the past three years, small-scale research projects relating to malting quality barley production have been conducted at the MSU Upper Peninsula Research and Extension Center (UPREC) in Chatham, Mich. (see photos below). Disease management, nitrogen fertility and variety evaluation have been the focus so far. The idea driving these trials has been to create a new cash crop opportunity for northern Michigan farmers with the possibility of entering the commodity malting barley markets with points of sale in Wisconsin or further west.

During summer 2013, the concept of local malting barley grain and malt production emerged with strong industry support from the Michigan Brewers Guild. With over 140 micro-breweries in the state and more coming along, there may be real opportunities for specialty malting barley grain production. One problem is the lack of smaller scale, local malting facilities to process the barley grain into a malt product available to brewers.

Efforts are underway to expand research and development for local malt production statewide, including production of malting grade barley grain. Key players include the UPREC, MSU Extension and the Michigan Brewers Guild.

Local malting barley grain production will probably not move barley acreage up a notch among the three top small grains in Michigan. However, it could provide good opportunities for farmers interested in a specialty crop.

This article was published by **Michigan State University Extension**. For more information, visit http://www.msue.msu.edu. To contact an expert in your area, visit http://expert.msue.msu.edu, or call 888-MSUE4MI (888-678-3464).

Aug. 2, 2013, malting barley variety trial at UPREC.

How to Manage Frost-Damaged Soybeans

Soybean producers can try tese recommendations to reduce adverse effects of an early frost.

***Mike Staton**, Michigan State University Extension*

The late planting season combined with some early frost events has increased the potential for frost damage to occur in soybeans this fall. The following recommendations from Michigan State University Extension will help you reduce negative impacts in the event that some of your soybean fields are damaged by frost.

Frost-damaged soybeans are generally considered salvageable as long as the plants reached the R6 growth stage at the time the killing frost occurred. The R6 growth stage occurs when the beans completely fill one pod at one of the upper four nodes on the main stem on 50 percent of the plants in the field. In dense, green soybeans, frost or freeze damage kills the upper leaves but rarely penetrates deeply into the canopy when temperatures remain above 30 degrees Fahrenheit. However, once the upper leaves have been damaged, subsequent freeze events will penetrate deeper into the canopy. Once the plants reach the R7 growth stage, yield reductions due to frost or freeze injury will be minor. The R7 growth stage occurs when one pod on the main stem has attained its mature color on 50 percent of the plants in the field.

Combine adjustment

Frost-damaged beans will probably be wetter than normal and more difficult to thresh. Your first step in adjusting for this condition is to reduce the concave clearance. If acceptable threshing still does not occur, increase the speed of the cylinder. Make incremental adjustments and check your progress after each adjustment.

Harvest at higher moisture contents

Soybeans that experienced severe frost or freeze damage extending well into the crop canopy will dry down slowly. In this case, producers should avoid significant harvest delays by harvesting frost-damaged fields at moisture levels between 16 and 18 percent. Data from the University of Wisconsin showed that shatter losses of 0.2 bushels per acre per day occur after the beans reach 16 to 18 percent moisture. The beans will need to be dried to a safe moisture level for storage (12 percent for 6 months). Electronic moisture meters tend to underestimate the moisture levels in green and immature soybeans so remember to add 1.5 percentage points to the moisture meter readings when testing mixtures of green, immature and mature beans and adjust drying times accordingly. In fields where only the upper leaves were damaged by frost, producers should wait and allow the beans to mature and dry to 14 to 15 percent in the field if possible.

Drying frost-damaged soybeans with ambient air

If only 2 to 3 points of moisture need to be removed, the air temperature is above 60 degrees F and below 75 percent relative humidity; no supplemental heat is required in drying bins equipped with full perforated floors and fans capable of producing one to two cfm/bu. However, drying will occur slowly. Drying times depend on initial moisture content, air flow, grain depth and weather conditions. Aeration fans should be run continuously as long as the beans are above 15 percent moisture and the average humidity of the air is below 70 to 75 percent.

Drying frost-damaged soybeans with supplemental heat

If you plan to add supplemental heat, be careful as soybeans are more fragile than corn and can be damaged by drying temperatures above 130 degrees F. These temperatures will cause excessive seed coat cracking and split beans. The relative humidity of the drying air should always be maintained above 40 percent to protect the integrity of the seed coats and prevent splits. Relative humidity is cut in half for each 20 degrees that the air is warmed. Growers can control the heat and humidity of the drying air by using short burner cycles or by changing the burner jets.

Storing frost-damaged beans

Green and immature soybeans are included in the total damage factor in the U.S. soybean grading standard. Elevators will discount loads containing green and immature soybeans and in some cases may reject entire loads if the damage levels are high. Discounts can be reduced by screening out the small beans, drying the rest to 12 percent moisture and storing them in aerated bins for at least six weeks. The green color may fade and marketing concerns should be reduced after this amount of time.

This article was produced by the SMaRT project (Soybean Management and Research Technology). The SMaRT project was developed to help Michigan producers increase soybean yields and farm profitability. Funding for the SMaRT project is provided by MSU Extension and the Michigan Soybean Checkoff program.

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